The Builder.

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E have reason to be satisfied with the manner in which the observations we made some time since, on the construction and arrangement of farm buildings, and more recently on the subject of land drainage,* were received throughout the country. That these have already produced practical good effects we happen to know. This being the case, and the matter being one of the greatest importance, we are led to add to those remarks some particulars on the subject of artificially irrigating farms, either with simple water or liquid manure. Mr. Mechi has adopted the plan on his farm at Kelvedon, in Essex, Tiptree Hall, and we made a journey thither the other day, with a good practical farmer and a man of sense, expressly to see what had been done. Mr. Mechi received us with the greatest frankness (we should say hospitality too, but this might send him more visitors than he might desire), and showed us all that he has in hand. The arrangement includes, broadly, a tank as a receptacle, pipes to distribute, and a pair of pumps to force the liquid through the latter to the required spot. The farm consists of 170 acres, and he has laid down about two miles of 3-inch iron piping, with a supply post for every 11 acres. Each pipe is 9 feet long, and cost 5*s.* 3*d.* or 7*d.* a foot. They are placed in the ground about 18 inches deep, and are jointed with tarred rope and melted lead, like ordinary street water-pipes. From the hydrant of the supply-posts 200 yards of gutta percha pipe (50 yards 2 inches in diameter, the rest 1½ inch) will reach any part of the farm. With some crops the handling of this would, perhaps, be difficult.

The tank (somewhat too close to the house) is 30 feet in diameter, and 30 feet deep. It is formed, with a bravery more to be admired than imitated, with half-brick sides and a 9-inch dome, and cost 80*l.* Into this all the manure produced by the cattle will be washed, and an occasional dead horse or so will be thrown in, "to make the gruel thick and slab," as Shakspeare says. The pumps were not completed when we were there, but we went to see them at the maker's, in Kelvedon, and were gratified by finding, where they certainly would not be looked for, a couple of intelligent engineers, Striffler and Alger, with a nice little steam-engine at work, plying their trade vigorously. The pumps are of four-horse power, 20-inch stroke, 5-inch barrel, and will throw, at their ordinary speed of twenty-five strokes in a minute, 49,000 gallons in ten hours. They could be made for 63*l.* "Judging from present appearances (says Mr. Mechi), I shall expend 600*l.* for the 170 acres, or about 3*l.* 12*s.* per acre, to cover the expense of the tank, pumps, pipeage, gutta percha hose, and every expense except the steam-engine, which I have already. Possibly it would be safer to calculate generally on 4*l.* to 4*l.* 5*s.* per acre, but much depends on the neighbourhood of iron, price of labour, bricks, &c. A man and a stout lad to assist him will, I expect, dispose of 600 hogsheads per diem, say enough for ten acres. A branch pipe of two inches will intersect the farm-yard, from which a powerful jet will wash the solid manure from under the boards, and cause it to flow into the great tank. This operation requires much water to render fluid the jelly-like manure of the ruminating animals: as the water will be propelled by a greater force than from an ordinary fire-engine, it is easy to imagine what a cleansing every corner will receive about twice a week. The flies in hot weather will be in considerable danger, and the heated roofs and buildings may be speedily cooled. The animals will, no doubt, get a shower-bath when deemed advisable. The whole affair is amazingly simple; in fact, is represented by the action of a fire-engine."

Details on this subject, worth looking for, will be found in the "Minutes of Information on Sewer Water," published by the General Board of Health.

The water of a bog drained by the owner gives 30,000 gallons a day, and will fall into the tank to the depth of 12 feet, which is an advantage, provided always, however, that the water be fitting. The pumps, by means of taps, will be enabled to distribute either liquid manure or simple water, as may be found desirable. The waste steam from the engine will enter the tank when needed to hasten fermentation. At the bottom of the tank, we should say, there is a "mixer," in the shape of a star of pipes bored at the ends and side to admit of a hundred jets of water being forced out of them.

By the arrangement that we have thus briefly described, Mr. Mechi considers that the great cost by labour, wear and tear of carts, roads, &c. in carting manure, will be avoided, as well as the treading and compression of the soil and waste of ammonia. Assuming that three-horse power of the engine will be required, the cost of a day's application on ten acres he puts thus,—

Interest on capital at 7½ per cent	6*s.* 0*d.*
Engineer's pay for one day (a youth from the farm)	1 6
One man in the field	1 6
One youth in ditto	1 0
Coals for engine	3 0
(This is, in fact, 1*s.* more than the cost, as screenings at 9*s.* per ton are used.)	
	13 0

"So that, in fact, 1*s.* 6*d.* per acre will more than cover the cost of applying 150 tons of manure or water, on ten acres of land; but if even it cost more, under less favourable circumstances than mine, the expense is ridiculously small in comparison with the ordinary cost and waste."

It must not be forgotten, however, that interest must be allowed on the capital invested all the year round.

In explanation of the remark, that "the manure will be washed from under the boards," we must mention for the information of such of our readers as are not aware of it, that all the beasts at Tiptree Hall, are kept upon boarded floors, consisting of battens 3 in. or 3½ in. wide, and for cows 1½ in. apart: for sheep, the battens are 1½ in. apart: with less space between they cannot be kept clean. Under the boards in each case, is formed a tank, in brick and cement, 2 ft. deep, and this was formerly cleared out about five times in the year. Now, however, it will be washed out as previously mentioned. By this mode of housing, no straw is needed, and its advocates claim for it very successful results. Amongst these we do enrol ourselves, but we shall not now enter into a consideration of the questions it involves. We will say, however, be it right or wrong, that Mr. Mechi is entitled to the thanks of all farmers and land-owners, for the course of inquiry which he has pursued, and the important experiments he has intelligently made. We shall look anxiously for the result of his present endeavour.

As we have suggested above, the nature of the water used is an important point. Two French *savans*, Messrs. Chevandier and Salvétat, have lately recorded some experiments on a large scale, which show this conclusively.* The problem they set themselves to solve was—"Is the fertility of irrigated fields in proportion to the quantities of water put in action, which would indicate that it is especially due to the action proper to water? Is it, on the contrary, to a certain point, independent of these quantities, and belonging to the presence of matters in solution which the water, acting as the vehicle, brings to the roots of the plants?"

The first year they regulated the irrigations according to the local customs. The field watered by the bad spring received 255,744 cubic metres of water per hectare, and the field watered by the good spring 164,281 cubic metres; the weight of the crops was, from the first field, 2,312 kilogrammes per hectare, and from the second, 7,896 kilogrammes.

In the second year, on the contrary, they placed themselves in identical conditions relative to the quantities of water, which were 126,273 cubic metres per hectare from the bad spring, and 130,311 cubic metres from the good spring. The weight of the crop was 2,749 kilogrammes per hectare from the field watered from the bad spring, and 10,469 kilogrammes from the field which had the water of the good spring.

"We thus see," say they, "that with equal quantities of water, and in conditions, in other respects perfectly comparable, or even with larger quantities of water from the bad spring, the crop of the meadow watered by this spring has only been one-third or one-fourth of the crop produced under the influence of water from the good spring. It is then in the quality of the waters, and not in their quantity, that we should seek for the causes of these very considerable differences in the crops."

The gases, and the mineral or organic matters dissolved or held in suspension in these waters, were found to be nearly similar, and they, therefore, only sought the solution of the problem in the *organic substances* dissolved in the waters of irrigation. According to the centesimal composition of these matters, in the two springs taken as types in this extract, oxygen and hydrogen were found in the same proportion. But these matters were more rich in carbon in the bad spring, and more rich in nitrogen in the good. The nitrogen of the good spring was to that of the bad as 100 is to 42, whilst the carbon of the bad spring was to that of the good spring as 100 is to 94.

These two proportions do not suffice to explain the different fertilising powers. "But

* See p. 209, *ante*; and vol. ix.

* Reported in *The Chemist*, from the *Comptes Rendus*, of February 1852.